Dennis E. Krause

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Wabash College
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Education

Ph.D., Physics, Purdue University, December 1994

Dissertation: *The Zel'dovich Electric Dipole Moment in Atoms*

Advisor: Ephraim Fischbach

M.S., Physics, University of Wisconsin-Milwaukee, May 1987

B.A., Physics, Saint Olaf College, May 1984

Teaching Positions

Professor, Wabash College (July 2013—Present)
Associate Professor, Wabash College (July 2004—June 2013)
Assistant Professor, Wabash College (July 1998—June 2004)

Taught all levels of physics and all-college courses.

Visiting Assistant Professor, Williams College (Fall 1995—Spring 1998)

Taught introductory physics and lab, physics for liberal arts majors, thermal physics, particle physics, and January term course "Confronting the Mysterious."

Visiting Assistant Professor, Purdue University (Spring 1995)

Taught introductory physics for engineering students.

Graduate Teaching Assistant, Purdue University, (August 1987–1993)

Taught introductory physics recitation sections, introductory lab, lectured for introductory course, was coordinator for help center.

Graduate Teaching Assistant, University of Wisconsin-Milwaukee, (August 1984–May 1987)

Taught introductory physics recitation sections.

Research Positions

Adjunct Professor, Purdue University (Winter 2016–Spring 2026)
Adjunct Associate Professor, Purdue University (Fall 2004–Fall 2015)
Adjunct Assistant Professor, Purdue University (Fall 1998–Summer 2004)

Awards

Purdue University Special Initiative Dissertation Year Fellowship (1993)

Purdue University Physics Department Edward S. Akeley Prize honoring outstanding physics graduate students in theoretical physics (1994)

Wabash College McLain-McTurnan-Arnold Research Scholar (2004)

Wabash College Charles D. LaFollette Lecturer (2015)

Professional Memberships

American Physical Society
American Association of Physics Teachers
Council on Undergraduate Research

Service to the College

Chair, Physics Department (2002–2004, 2005–2011, 2016–2018, 2022–2025)

Committees Served: Academic Policy, Committee for Institutional Improvement, Committee on Committees, Computer Advisory, Faculty Development, Lilly Grant, McLain-McTurnan-Arnold Research Scholar, Pre-engineering, Safety, Scientific Integrity, Secondary Licensure Program, Science Building, Teaching & Learning, Technology Advisory

Physics Top 10 Day, Honor Scholar Exam, and Scarlet Honors Coordinator

Recently Taught Courses

Freshman Tutorial

- It's About Time (2021, 2023)
- Confronting the Mysterious (2010, 2012)

Enduring Questions (2017, 2023)

Physics 111 General Physics I (2006–2009, 2016–2017, 2019–2024)

Physics 112 General Physics II (2010–2011, 2013-2015, 2020-2025)

Physics 209 Thermal and Relativity Physics (2012-2016)

Physics 210 Modern Physics (2010, 2013, 2015-2018, 2021)

Physics 230 Thermal Physics (2015)

Physics 277/278 Special Topics

- Introduction to Cosmology (2011, 2018)
- Oscillations and Waves (2014)
- Quantum Information and Computing (2022)

Physics 314 Electrodynamics (2007-2009, 2020, 2024–2025)

Physics 315 Quantum Mechanics (2005–2010, 2013-2014, 2017, 2022-2024, Summer 2025)

Physics 377/378 (Advanced Special Topics)

- Quantum Mechanics II (2019)

Physics 382 Advanced Lab (2017)

Physics 287/288/387/388 Independent Study

- Astrophysics (2007)
- Particle Physics (2011)
- General Relativity (2013, 2016)
- Advanced Quantum Mechanics (2014)

Graduate Physics Ph.D. Committees

- Sheakha Aldiahan, Indiana University, "Calculations of Exotic Spin-Dependent Long-Range Interactions from Spin-Independent Couplings in Second-Order," defended Summer 2018.
- Matt Kay (Wabash '03), Purdue University, "New Methodologies for Measuring and Monitoring Nuclear Decay Parameters for Time Dependent Behavior," defended Fall 2018.
- Robert Orlando, Purdue University, "Possible Quintessence-like Pseudoscalar Dark Energy Effects on ^{56}Fe Nuclear Transition Energies Observed in Supernova 1991T," defended Spring 2025.

April 26, 2026

Research Students

April 26, 2026

Wabash College

Prasun Panthi ('27)

- Project: Formation and characteristics of a galactic ultralight dark matter halo (Summer 2024)

Evan Baldwin ('26)

- Project: The nature of quantum entanglement, quantum correlations, and their application to fermions and bosons (Summer 2023).
- Project: Dark Matter Wake Forces (Summer 2024)

Gus Sanchez ('26)

- Project: Creating and destroying quantum entanglement (Summer 2023).

Nikolai Jones ('24)

- Project: Time Dilation in the Forbidden Region (Summer 2022)
- Paper: Submitted to *The Physics Teacher*, "Entering the Forbidden Region: When a Part Can Be Larger than the Whole"

Chad Wunderlich ('21)

- Project: Setting Limits on New Forces and Ultralight Dark Matter using Force Experiments (Summer 2020)

Joseph Bertaux ('19)

- Project: Dark Matter and Cosmic Neutrino Background Drag Forces (Summers 2017 & 2018)

Quan Le Thien ('18)

- Project: Neutrino Oscillations (Summer & Fall 2017, Spring 2018)
- Publication:
  - "Spin-independent two-neutrino exchange potential with mixing and CP violation," Q. Le Thien and D. E. Krause, *Physical Review D* **99**, 116006 (2019).

Tim Riley ('18)

- Project: Limits on New Inverse Power Law Forces from Free-fall Experiments (Spring 2017)

Inbum Lee ('16)

- Project: Motion of Quantum Systems with Indefinite Mass (Summer 2015)
- Publication:
  - "Relativistic coupling of internal and centre of mass dynamics in classical and simple bound quantum mechanical systems," D. E. Krause and I. Lee, *European Journal of Physics* **38**, 045401 (2017).

Eric Need ('16)

- Project: Limits on New Forces from the Decca Experiment (Summer 2015)

Aaron Wirthwein ('17)

- Project: String Interferometry (Summer 2014)
- Winner of Phi Beta Kappa Research Prize

Cameron Dennis ('16)

- Project: Negative Refraction in 1-D and 2-D Metamaterials (Summer 2014)
- Winner of Phi Beta Kappa Research Prize

Likai Yan ('15)

- Project: Quantum Zeno Effect (Summer 2013)

Nicholas Reese ('14)

- Project: Center of Mass and Relative Motion in Non-uniform Fields (Summer 2012)

Yifei Sun ('13)

- Project: Problems with Pulley Problems (2010-2011)
- Publication:
  - "Can a String's Tension Exert a Torque on a Pulley?" D. E. Krause and Y. Sun, *The Physics Teacher* **49**, 234–235 (2011).

Zachary Rohrbach ('12)

- Project: Quantum Unstable Particles (Summer 2010, 2011)
- Publications:
  - "Testing the equivalence principle with unstable particles," Y. Bonder, E. Fischbach, H. Hernandez-Coronodo, D. E. Krause, Z. Rohrbach, and D. Sudarsky, *Physical Review D* **87**, 125021 (2013).
  - "*A priori* which-way information in quantum interference with unstable particles," D. E. Krause, E. Fischbach, and Z. J. Rohrbach, *Physics Letters A* **378**, 2490–2494 (2014).

Diego Aliaga ('11)

- Project: 1-Dimensional Casimir Force (Summer 2009)

Sabir Shrestha ('09)

- Project: Energy Conservation in a Massive Spring System (Summer 2008)

Prasanna Pokhrel ('07)

- Project: Simulating Waves in Negative Index Materials (Summer 2005)
- Project: Yukawa and Inverse-Power-Law Forces for the Cylinder-Plate Geometry (Summer 2006)

Nathan Flory ('04)

- Project: Development of New Introductory Lab Experiments (Summer 2003)

Walter Keeley ('03)

- Project: Anomalous Results from the Adiabatic Gas Law Apparatus (Summer 2002)
- Publication:
  - "Determining the Heat Capacity Ratio of Air from 'Almost Adiabatic' Compressions," D. E. Krause and W. Keeley, *The Physics Teacher* **42**, 481-483 (2004).

Suniti Karuntillake ('01) and Michael West ('02)

- Project: Search for New Short-Ranged Forces (Summer 2000)
- Publications:
  - "Gravity Experiments in the Casimir Regime," D. E. Krause, E. Fischbach, S. W. Howell, S. Karunatillake, and M. West, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity,* edited by R. T. Jantzen, V. Gurzadyan, and R. Ruffini (World Scientific, Singapore, 2002), 1822–1824.
  - "Experimental Search for New String-Inspired Forces using Atomic Force Microscopy," E. Fischbach, S. W. Howell, S. Karunatillake, D. E. Krause, and M. West, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity,* edited by R. T. Jantzen, V. Gurzadyan, and R. Ruffini (World Scientific, Singapore, 2002), 1817–1821.
  - "Testing gravity in space and at ultrashort distances," E. Fischbach, S. W. Howell, S. Karunatillake, D. E. Krause, R. Reifenberger, and M. West, *Classical and Quantum Gravity* **18**, 2427–2434 (2001).

Chris Deufel ('00)

- Project: Search for New Short-Ranged Forces (1999-2000)

Williams College

Kathryn Schaffer ('98, Bard College) and Sarah Donnelly ('99, University of Connecticut)

- Project: Zel'dovich Moment in Atoms (Summer 1997)

Allegra Martin ('99)

- Project: Video Analysis for the Introductory Physics Laboratory (Summer 1997)

Joe Reiner ('97, Rochester Institute of Technology)

- Project: New Phenomena in Hydrogen with Parity and Time Reversal Violation (Summer 1996)

Andy Stortz ('98) and Zoë Leinhardt ('98, Carleton College)

- Project: The Lamb Model of Open Systems (Summer 1996)

Publications

April 26, 2026

70. "How Can a Quantum Particle be Found in a Classically Forbidden Region?" D. E. Krause and N. Jones, *The Physics Teacher* **63**, 16–19 (2025).

69. "Phenomenological implications of a magnetic 5th force," D. E. Krause, J. Bertaux, A. M. McNamara, J. T. Gruenwald, C. Y. Scarlett, E. Fischbach, *International Journal of Modern Physics A* **38**, 2350007 (2023).

68. "Some recent developments in 5th force searches," E. Fischbach, D. E. Krause, M. H. McDuffie, and M. J. Mueterthies, in *2021 Gravitation: Proceedings of the 55th Rencontres de Moriond,* edited by E. Augé, J. Dumarchez, and J. Trân Thanh Vân (ARISF, 2021), 29–32.

67. "Significance of composition-dependent effects in fifth-force searches," E. Fischbach, J. T. Gruenwald, D. E. Krause, M. H. McDuffie, M. J. Mueterthies, C. Y. Scarlett, *Physics Letters A* **399**, 127300 (2021).

66. "Unitarily inequivalent vacua and long-range forces: Phenomenology with scalar boson mass-shift," Q. Le Thien and D. E. Krause, *Modern Physics Letters A* **35**, 2050139 (2020).

65. "The 2-Neutrino Exchange Potential with Mixing: A Probe of Neutrino Physics and CP Violation," D. E. Krause and Q. Le Thien, in *Proceedings of the Eighth Meeting on CPT and Lorentz Symmetry,* edited by R. Lehnert (World Scientific, Singapore, 2020), pp. 190–193.

64. "The Eötvös Paradox: The Enduring Significance of Eötvös' Most Famous Paper," E. Fischbach and D. E. Krause, *Proceedings of Science* **FFK2019**, 039 (2019).

63. "Spin-independent two-neutrino exchange potential with mixing and CP violation," Q. Le Thien and D. E. Krause, *Physical Review D* **99**, 116006 (2019).

62. "Indications of an unexpected signal associated with the GW170817 binary neutron star inspiral," E. Fischbach, V.E. Barnes, N. Cinko, J. Heim, H.B. Kaplan, D.E. Krause, J.R. Leeman, S.A. Mathews, M.J. Mueterthies, D. Neff, M. Pattermann, *Astroparticle Physics* **103**, 1–6 (2018).

61. "Calculations of the dominant long-range, spin-independent contributions to the interaction energy between two nonrelativistic Dirac fermions from double-boson exchange of spin-0 and spin-1 bosons with spin-dependent couplings," S. Aldaihan, D. E. Krause, J. C. Long, and W. M. Snow, *Physical Review D* **95**, 096005 (2017).

60. "Relativistic coupling of internal and centre of mass dynamics in classical and simple bound quantum mechanical systems," D. E. Krause and I. Lee, *European Journal of Physics* **38**, 045401 (2017).

59. "Constraining Exotic Weakly Coupled Long-Range Interactions with Pseudoscalar and Axial Couplings with Unpolarized Data," S. Aldaihan, W. M. Snow, D. E. Krause, J. C. Long, and E. Fischbach, in *Proceedings of the Seventh Meeting on CPT and Lorentz Symmetry,* edited by V. A. Kostelecký (World Scientific, Singapore, 2017), pp. 280–282.

58. "Is There a Signal for Lorentz Noninvariance in Existing Radioactive Decay Data?" M. J. Mueterthies, D. E. Krause, A. Longman, V. E. Barnes, and E. Fischbach, in *Proceedings of the Seventh Meeting on CPT and Lorentz Symmetry,* edited by V. A. Kostelecký (World Scientific, Singapore, 2017), pp. 197–200.

57. "Stronger Limits on Hypothetical Yukawa Interactions in the 30–8000 nm Range," Y. -J. Chen, W. K. Tham, D. E. Krause, D. López, E. Fischbach, and R. S. Decca, *Physical Review Letters* **116**, 221102 (2016).

56. "Weak Equivalence Principle, Lorentz Noninvariance, and Nuclear Decays," E. Fischbach, V. E. Barnes, J. M. Heim, D. E. Krause, and J. M. Nistor, in *2015 Gravitation 1000 years after GR: Proceedings of the 50th Rencontres de Moriond,* edited by E. Augé, J. Dumarchez, and J. Trân Thanh Vân (ARISF, 2015), 173–176.

55. "*A priori* which-way information in quantum interference with unstable particles," D. E. Krause, E. Fischbach, and Z. J. Rohrbach, *Physics Letters A* **378**, 2490–2494 (2014).

54. "Testing the equivalence principle with unstable particles," Y. Bonder, E. Fischbach, H. Hernandez-Coronodo, D. E. Krause, Z. Rohrbach, and D. Sudarsky, *Physical Review D* **87**, 125021 (2013).

53. "Searches for solar-influenced radioactive decay anomalies using spacecraft RTGs," D. E. Krause, B. A. Rogers, E. Fischbach, J. B. Buncher, A. Ging, J. H. Jenkins, J. M. Longuski, N. Strange, P. A. Sturrock, *Astroparticle Physics* **36**, 42–46 (2012).

52. "Casimir force between a microfabricated elliptical cylinder and plate," R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, and V. M. Mostepanenko, *Physical Review A* **84**, 042502 (2011).

51. "Capacitance Measurements and Electrostatic Calibration in Experiments Measuring the Casimir Force," R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, U. Mohideen, and V. M. Mostepanenko, *International Journal of Modern Physics A* **26**, 3930–3943 (2011).

50. "Observation of the Thermal Casimir Force is Open to Question," G. L. Klimchitskaya, M. Bordag, E. Fischbach, D. E. Krause and V. M. Mostepanenko, *International Journal of Modern Physics A* **26**, 3918–3929 (2011).

49. "Can a String's Tension Exert a Torque on a Pulley?" D. E. Krause and Y. Sun, *The Physics Teacher* **49**, 234–235 (2011).

48. "Possibility of measuring the thermal Casimir interaction between a plate and a cylinder attached to a micromachined oscillator," R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, and V. M. Mostepanenko, *Physical Review A* **82**, 052515 (2010).

47. "Study of the dependence of ^{198}Au half-life on source geometry," R. M. Lindstrom, E. Fischbach, J. B. Buncher, G. L. Greene, J. H. Jenkins, D. E. Krause, J. J. Mattes, and A. Yue, *Nuclear Instruments and Methods A* **622**, 93–96 (2010).

46. "On the validity of constraints on light elementary particles and extra-dimensional physics from the Casimir effect," E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and V. M. Mostepanenko, *European Journal of Physics* **68**, 223–226 (2010).

45. "Evidence of correlations between nuclear decay rates and Earth-Sun distance" J. H. Jenkins, E. Fischbach, J. B. Buncher, J. T. Gruenwald, D. E. Krause, and J. J. Mattes, *Astroparticle Physics* **32**, 42–46 (2009).

44. "Time-Dependent Nuclear Decay Parameters: New Evidence for New Forces?" E. Fischbach, J. B. Buncher, J. T. Gruenwald, J. H. Jenkins, D. E. Krause, J. J. Mattes, and J. R. Newport, *Space Science Reviews* **145**, 285–335 (2009).

43. "Application of the proximity force approximation to gravitational and Yukawa-type forces," R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, U. Mohideen, and V. M. Mostepanenko, *Physical Review D* **79**, 124021 (2009).

42. "Comment on 'Contribution of Drifting Carriers to the Casimir-Lifshitz and Casimir-Polder Interactions with Semiconductor Materials,' " R. S. Decca, E. Fischbach, B. Geyer, G. L. Klimchitskaya, D. E. Krause, D. López, U. Mohideen, and V. M. Mostepanenko, *Physical Review Letters* **102**, 189303 (2009).

41. "Comment on 'Anomalies in electrostatic calibrations for the measurement of the Casimir force in a sphere-plane geometry,' " R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, U. Mohideen, and V. M. Mostepanenko, *Physical Review A* **79**, 026101 (2009).

40. "Why screening effects do not influence the Casimir force," V. M. Mostepaneko, R. S. Decca, E. Fischbach, B. Geyer, G. L. Klimchitskaya, D. E. Krause, D. López, and U. Mohideen, *International Journal of Modern Physics A* **24**, 1721–1742 (2009).

39. "Stronger constraints on non-Newtonian gravity from the Casimir effect," V. M. Mostepanenko, R.S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and D. Lopez, *Journal of Physics A* **41** 164054 (2008).

38. "Searching for hypothetical forces in the Casimir regime using a MEMS based force sensor," R.S. Decca, D. López, D. E. Krause, E. Fischbach, *Smart Sensors, Actuators, and MEMS III*, ed. by T. Becker, C. Cané, N. S. Barker, *Proceedings of SPIE*, **6589**, K5890-K5890 (2007).

37. "Novel constraints on light elementary particles and extra-dimensional physics from the Casimir effect," R.S. Decca, D. López, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, V. M. Mostepanenko, *European Journal of Physics C* **51**, 963–975 (2007).

36. "Tests of new physics from precise measurements of the Casimir pressure between two gold-coated plates," R.S. Decca, D. López, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, V. M. Mostepanenko, *Physical Review D* **75**, 077101 (2007).

35. "Experimental Investigation of the Casimir Force beyond the Proximity Force Approximation," D. E. Krause, R. S. Decca, D. López, E. Fischbach, *Physical Review Letters* **98**, 050403 (2007).

34. "Rigorous approach to the comparison between experiment and theory in Casimir force experiments," G. L. Klimchitskaya, F. Chen, R. S. Decca, E. Fischbach, D. E. Krause, D. López, U. Mohideen, and V. M. Mostepanenko, *Journal of Physics A* **39**, 6485–6493 (2006).

33. "Present status of controversy regarding the thermal Casimir force," V. M. Mostepanenko, V. B. Bezerra, R. S. Decca, B. Geyer, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, and C. Romero, *Journal of Physics A* **39**, 6589-6600 (2006).

32. "Comment on 'Temperature dependence of the Casimir effect,' " V. B. Bezerra, R. S. Decca, E. Fischbach, B. Geyer, G. L. Klimchitskaya, D. E. Krause, D. López, V. M. Mostepanenko, and C. Romero, *Physical Review E* **73**, 028101 (2006).

31. "Prospects for Detecting Gravity at the Nanoscale," D. E. Krause, E. Fischbach, and R. S. Decca, in *New Views on the Universe*, the Proceedings of the 5th Rencontres du Vietnam, edited by L. Celnikier, Y. Giraud-Héraud, and J. Trân Thanh Vân (The Gioi Publishers, Hanoi, 2005), 91–95.

30. "MEMS-Based Force Sensor: Design and Applications," D. L. López, R. S. Decca, E. Fischbach, and D. E. Krause, *Bell Labs Technical Journal* **10** (3), 61–80 (2005).

29. "Constraining new forces in the Casimir regime using the isoelectronic technique," R. S. Decca, D. L. López, H. B. Chan, E. Fischbach, D. E. Krause, and J. R. Jamell, *Physical Review Letters* **94**, 240401 (2005).

28. "Precise comparison of theory and new experiment for the Casimir force leads to stronger constraints on thermal quantum effects and long-range interactions," R. S. Decca, D. López, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and V. M. Mostepanenko, *Annals of Physics* **318**, 37–80 (2005).

27. "Casimir effect as a test for thermal corrections and hypothetical long-range interactions," G. L. Klimchitskaya, R. S. Decca, E. Fischbach, D. E. Krause, D. López, and V. M. Mostepanenko, *International Journal of Modern Physics A* **20**, 2205–2221 (2005).

26. "Limits on New Inverse-Power Law Forces," D. E. Krause and E. Fischbach, in *Particle Physics and the Universe*, the Proceedings of the 9th Adriatic Meeting, edited by J. Trampetić and J. Wess (Springer, Berlin, 2005), 73–82.

25. "Determining the Heat Capacity Ratio of Air from 'Almost Adiabatic' Compressions," D. E. Krause and W. Keeley, *The Physics Teacher* **42**, 481-483 (2004).

24. "Precise Measurements on the Casimir Regime," R. S. Decca, D. López, H. B. Chan, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and V. M. Mostepanenko, in *Quantum Field Theory Under the Influence of External Conditions*, the Proceedings of the Sixth Workshop on Quantum Field Theory under the Influence of External Conditions, edited by K. A. Milton (Rinton Press, Princeton, N.J, 2004), 23–29.

23. "Searching for New Forces and Extra Dimensions using Casimir Force Experiments," D. E. Krause, R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. López, and V. M. Mostepanenko, in *Quantum Field Theory Under the Influence of External Conditions*, the Proceedings of the Sixth Workshop on Quantum Field Theory under the Influence of External Conditions, edited by K. A. Milton (Rinton Press, Princeton, N.J, 2004), 30–35.

22. "Precise determination of the Casimir force and first realization of a 'Casimir-less' experiment," R. S. Decca, D. López, H. B. Chan, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, and V. M. Mostepanenko, *Journal of Low Temperature Physics* **135**, pp. 63–74 (2004).

21. "Improved tests of extra-dimensional physics and thermal quantum field theory from new Casimir force measurements," R. S. Decca, E. Fischbach, G. L. Klimchitskaya, D. E. Krause, D. López, and V. M. Mostepanenko, *Physical Review D* **68**, 116003 (2003).

20. "Testing Newtonian Gravity at the Nanometer Distance Scale using the Iso-electronic Effect," E. Fischbach, D. E. Krause, R. S. Decca, and D. López, *Physics Letters A* **318**, pp. 165–171 (2003).

19. "Constraining the couplings of massive pseudoscalars using gravity and optical experiments," E. G. Adelberger, E. Fischbach, D. E. Krause, and R. D. Newman, *Physical Review D* **68**, 062002 (2003).

18. "Measurement of the Casimir force between dissimilar metals," R. S. Decca, D. López, E. Fischbach, and D. E. Krause, *Physical Review Letters* **91**, 050402 (2003).

17. "Extra Dimensions, New Forces, and Non-Newtonian Gravity," E. Fischbach and D. E. Krause, in *2001 Very High Energy Phenomena in the Universe: Proceedings of the XXXVIth Rencontres de Moriond,* edited by M. Boër and J. Trân Thanh Vân (Thê' Giói Publishers, Vietnam, 2003), 337–346.

16. "Isotopic Dependence of the Casimir Force," D. E. Krause and E. Fischbach, *Physical Review Letters* **89**, 190406 (2002)

15. "Gravity Experiments in the Casimir Regime," D. E. Krause, E. Fischbach, S. W. Howell, S. Karunatillake, and M. West, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity,* edited by R. T. Jantzen, V. Gurzadyan, and R. Ruffini (World Scientific, Singapore, 2002), 1822–1824.

14. "Experimental Search for New String-Inspired Forces using Atomic Force Microscopy," E. Fischbach, S. W. Howell, S. Karunatillake, D. E. Krause, and M. West, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity,* edited by R. T. Jantzen, V. Gurzadyan, and R. Ruffini (World Scientific, Singapore, 2002), 1817–1821.

13. "Measuring Gravity at Sub-Millimeter Distances," P. Boynton, E. Fischbach, and D. E. Krause, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity,* edited by R. T. Jantzen, V. Gurzadyan, and R. Ruffini (World Scientific, Singapore, 2002), 619–622.

12. "New constraints on ultrashort-ranged Yukawa interactions from atomic force microscopy," E. Fischbach, D. E. Krause, V. M. Mostepanenko, and M. Novello, *Physical Review D* **64**, 075010 (2001).

11. "Testing gravity in space and at ultrashort distances," E. Fischbach, S. W. Howell, S. Karunatillake, D. E. Krause, R. Reifenberger, and M. West, *Classical and Quantum Gravity* **18**, 2427–2434 (2001).

10. "Testing Newtonian Gravity at Ultra-short Distances," D. E. Krause and E. Fischbach, *International Journal of Modern Physics D* **10**, 25–31 (2001). [This essay received an "honorable mention" in the Annual Essay Competition of the Gravity Research Foundation for the year 2000.]

9. "Searching for Extra Dimensions and New String-Inspired Forces in the Casimir Regime," D. E. Krause and E. Fischbach, in *Gyros, Clocks and Interferometers...: Testing Relativistic Gravity in Space*, edited by C. Lammerzahl, C. W. F. Everitt, and F. W. Hehl (Springer-Verlag, Berlin, 2001, 292–309.

8. "Constraints on Light Pseudoscalars Implied by Tests of the Gravitational Inverse-Square Law," E. Fischbach and D. E. Krause, *Physical Review Letters* **83**, 3593–3596 (1999).

7. "New Limits on the Couplings of Light Pseudoscalars from Equivalence Principle Experiments," E. Fischbach and D. E. Krause, *Physical Review Letters* **82**, 4753–4756 (1999).

6. "Higher-order weak interactions and the equivalence principle," E. Fischbach, D. E. Krause, and C. Talmadge, *Physical Review D* **52**, 5417—5427 (1995).

5. "Time Dependent Perturbation Theory and the Zel'dovich Electric Dipole Moment in Atoms," D. Tadić, D. E. Krause, E. Fischbach, and D. Sudarsky, *Fizika B* **4**, 259—272 (1995).

4. "Multipole Radiation from Massive Fields: Application to Binary Pulsar Systems," D. E. Krause, H. T. Kloor, and E. Fischbach, *Physical Review D* **49**, 6892–6906 (1994).

3. "A New Mechanism for Constraining Macroscopic-Ranged Forces," D. E. Krause, E. Fischbach, C. Talmadge, D. Sudarsky, and D. Tadić, in *Perspectives in Neutrinos, Atomic Physics, and Gravitation*, Proceedings of the XXVIIIth Recontre de Moriond, edited by J. Trân Thanh Vân, T. Damour, E. Hinds, and J. Wilkerson (Editions Frontières, Gif-sur-Yvette, 1993), 455–464.

2. "Non-Newtonian Gravity and New Weak Forces: An Index of Measurements and Theory," E. Fischbach, G. T. Gillies, D. E. Krause, J. G. Schwan, and C. Talmadge, *Metrologia* **29**, 213–260 (1992).

1. "Exponential Models of non-Newtonian Gravity," E. Fischbach, C. Talmadge, and D. E. Krause, *Physical Review D* **43**, 460–467 (1991).

Unpublished Research Papers (arXiv)

April 26, 2026

8. "Implications of Recent KATRIN Results for Lower-Limits on Neutrino Masses," E. Fischbach, D. E. Krause, Q. Le Thien, C. Y. Scarlett, arXiv:2208.03790 [hep-ph] (2022).

7. "Indications of a Fifth Force Coupling to Baryon Number in the Potter Test of the Weak Equivalence Principle," M. H. McDuffie, E. Fischbach, D. E. Krause, J. T. Gruenwald, M. J. Mueterthies, C. Y. Scarlett, B. Freeman, arXiv:2105.03501 [hep-ph] (2021).

6. "Anomalies in Radioactive Decay Rates: A Bibliography of Measurements and Theory," M. H. McDuffie, P. Graham, J. L. Eppele, J. T. Gruenwald, D. Javorsek II, D. E. Krause, E. Fischbach, arXiv:2012.00153 [nucl-ex] (2020).

5. "Comment on 'Testing claims of the GW170817 binary neutron star inspiral affecting β-decay rates," E. Fischbach, D. E. Krause, M. Pattermann, arXiv:2003.00092 [nucl-ex] (2020).

4. "Generalized Analysis of the Eötvös Experiment," M. J. Mueterthies, E. Fischbach, V. E. Barnes, J. Bertaux, D. E. Krause, A. Longman, arXiv:2001.03752 [hep-ph] (2020).

3. "The 2-Neutrino-Exchange Potential with Mixing: A New Arena for Neutrino Mixing and CP-Violation," Q. Le Thien and D. E. Krause, arXiv:1909.07518 [hep-ph] (2019).

2. "Which-Way Information in Double-Slit and COW Experiments with Unstable Particles," D. E. Krause, E. Fischbach, Z. J. Rohrbach, arXiv:1407.1087 [quant-ph] (2014).

1. "Comment on 'Possible resolution of the Casimir force finite temperature correction "controversies," ' " R. S. Decca, E. Fischbach, B. Geyer, G. L. Klimchitskaya, D. E. Krause, D. López, U. Mohideen, V. M. Mostepanenko, arXiv:0803.4247 [quant-ph] (2008).

Presentations

April 26, 2026

External Talks

21. "Nudges from the Dark Side: Ultralight Pseudoscalar Dark Matter Forces," Zoom Physics Colloquium, Western Kentucky University, March 2025.

20. "$E = mc^2$ and the Quantum Mechanics of Systems with Indefinite Mass," keynote lecture, Annual Meeting of the Indiana section of the American Association of Physics Teachers, Indiana University Kokomo, April 2023.

19. "Entering the Forbidden Region: When a Part Can be Larger than the Whole," Annual Meeting of the Indiana section of the American Association of Physics Teachers, Indiana University Kokomo, April 2023.

18. "Searching for Ultralight Dark Matter Forces," Monon Bell Physics Lecture, DePauw University, Greencastle, IN, November 2022.

17. "The 2-Neutrino Exchange Potential with Mixing: A Probe of Neutrino Physics and CP Violation," Eighth Meeting on CPT and Lorentz Symmetry, Indiana University, May 2019.

16. "The 2-Neutrino Exchange Potential: A Window into the Weirdest Particles in Physics," Kalamazoo College Physics Colloquium, May 2019.

15. "The 2-Neutrino Exchange Potential: A Window into the Weirdest Particles in Physics," Knox College Physics Colloquium, April 2019.

14. "What's Causing Annual Periodicities in Beta Decay Data," online talk for QuarkNet monthly meeting, December 2016.

13. "Which-Way Information and Quantum Interference with Undecayed Unstable Particles," Monon Bell Physics Lecture, DePauw University, Greencastle, IN, November 2013.

12. "A Quantum Twin Paradox," Meeting of the Anacapa Society, Hamline University, May, 2012.

11. "Clocks Viewed by Relativistic Observers," Annual Meeting of the Indiana section of the American Association of Physics Teachers, IUPUI, April 2012.

10. "Measurement and Uncertainty the GUM Way," Annual Meeting of the Indiana section of the American Association of Physics Teachers, Plainfield High School, April 2011.

9. "An Energy Conservation Lab using a Vertical Simple Harmonic Oscillator," Annual Meeting of the Indiana section of the American Association of Physics Teachers, Indiana University, April 2009.

8. "Searching for New Forces at Sub-micron Separations using Casimir Force Experiments," Monon Bell Physics Lecture, DePauw University, Greencastle, IN, November 9, 2005.

7. "Searching for New Forces and Extra Dimensions at Sub-Micron Separations using Casimir Force Experiments," American Physical Society April Meeting, Tampa, FL, April 2005.

6. "Searching for New Forces and Extra Dimensions at Submicron Distances," Physics Department colloquium, Hastings College, Hastings, NE, March 29, 2005.

5. "Searching for New Forces and Extra Dimensions using Casimir Force Experiments," Physics Department colloquium, Indiana State University, March 19, 2004.

4. "Searching for New Forces and Extra Dimensions using Casimir Force Experiments," invited talk, Sixth Workshop on Quantum Field Theory under the Influence of External Conditions, University of Oklahoma, September 16, 2003.

3. "Searching for New Forces and Extra Dimensions at Sub-Micron Separations using Casimir Force Experiments," research talk, annual meeting of the Indiana section of the American Association of Physics Teachers, Indiana University, April 2003.

2. "Gravity Experiments in the Casimir Regime," research talk, Ninth Marcel Grossmann Meeting on General Relativity, Rome, Italy, July 2000.

1. "Exploring Quantum Electrodynamics, the Arrow of Time, and Other Things with a Spring and String," Physics Department colloquium, Towson University, April 1997.

Wabash College Talks

37. "The Magic of Quantum Mechanics," Physics Department Colloquium, January 2026.

36. "Nudges from the Dark Side: Ultralight Pseudoscalar Dark Matter Forces," Physics Department Colloquium, April 2025.

35. "$E = mc^2$ and the Quantum Mechanics of Systems with Indefinite Mass," Physics Department Colloquium, February 2023.

34. "When a Part is Larger than the Whole: A Tale from the Forbidden Region," Ides of August, August 2022.

33. "Cornering the Neutrino Mass," Physics Department Colloquium, March 2022.

32. "Search for Ultralight Dark Matter Forces," Monon Bell Physics Lecture, November 2019.

31. "The 2-Neutrino Exchange Potential: A Window into the Weirdest Particles in Physics," Physics Colloquium, April 2019.

30. "Quantum Origin of Macroscopic Forces: Getting Something From Nothing," Monon Bell Physics Lecture, November 2018.

29. "Physics and Big History," Big History Symposium, February, 2018.

28. "Dark matter can be a real a drag. . . ," with Joseph Bertaux ('19), Physics Department Colloquium, November 2017.

27. "First Observation of Gravitational Waves (from Colliding Black Holes)," A Year in Science Symposium, December 2016.

26. "What's Causing the Annual Periodicities in Beta Decay Data?" Physics Department Colloquium, September 2016.

25. "Grappling with the Quantum: Trying to Understand the Fundamental Rules Governing Our World," 36th Charles D. LaFollette Lecture, October, 2015.

24. "Taking Einstein Seriously: $E = mc^2$ and the Coupling of Internal and Center of Mass Motions," with Inbum Lee ('16), Physics Department Colloquium, October, 2015

23. "*A Priori* Which-Way Information and Quantum Interference with Unstable Particles," Physics Department Colloquium, February 2014.

22. "Which-Way Information and Quantum Interference with Unstable Particles," Physics Department Colloquium, October 2012.

21. "Which-Way Information and Interference: A novel quantum effect from unstable particles," Ides of August, August 2012.

20. "Searching for Radioactive Decay Anomalies using the Cassini Spacecraft," Physics Department Colloquium, February 2012.

19. "A Quantum Twin Paradox," Physics Department Colloquium, February 2011.

18. "The Quantum Twin Paradox," Ides of August, August 2010.

17. "Newton on the Mound: The Physics of a Baseball in Flight," Wally at the Bat: A Liberal Arts Symposium on Baseball, March 2010.

16. "The Casimir Effect: The Force of the Quantum Vacuum," Physics Department Colloquium [with Diego Aliaga ('10)], September 2009.

15. "The Not-So-Simple Simple Harmonic Oscillator," Ides of August, August 2008.

14. "The World Isn't Flat: The Casimir Force Beyond Parallel Plates," Physics Department Colloquium, February 2007.

13. "Searching for New Forces at Sub-micron Separations using Casimir Force Experiments," Physics Department colloquium, November 2005.

12. "The Casimir Force with Negative Index Materials," with Prasanna Pokhrel ('07), Physics Department colloquium, October 2005.

11. "Negative Refraction: What Happens When Light Bends the Wrong Way?" Ides of August, August 2005.

10. "Searching for New Forces and Extra Dimensions using Casimir Force Experiments," Physics Department colloquium, March 2004.

9. "Quantum Mechanics Meets Archimedes: Is there a Vacuum Buoyant Force?" Ides of August, August 2003.

8. "The Casimir Force and the Search for New Forces and Extra Dimensions," Physics Department colloquium, December 2002.

7. "Quantum Game Theory," Math Department colloquium, January 2002.

6. "The Quantum Vacuum: Much Ado about Nothing," Ides of August, August 2001.

5. "Constraining New Spatial Dimensions with Atomic Force Microscopy," Physics Department colloquium, April 2001.

4. "Looking Beyond 3-D: How to Understand and Search for New Compact Dimensions," Math Department colloquium, December 1999.

3. "Why is Testing Newtonian Gravity at Short Distances so Important?" Physics Department colloquium, September 1999.

2. "Searching for New Forces and New Dimensions by Testing Newtonian Gravity," Ides of August, August 1999.

1. "More than Four? The Search for New Fundamental Forces," Physics Department colloquium, April 1999.

Williams College Talks

6. "What Can Electric Dipole Moments Tell Us about Spacetime Symmetries?" Math Department colloquium, November 1997.

5. "What's so Interesting about Open Systems?" Physics Department seminar, July 1997.

4. "Springs, Strings, and Atoms: The Physics of Open Systems," Bronfman lunch seminar, October 1996.

3. "What's the Big Deal about Open Systems?" Physics Department seminar, June 1996.

2. "The Quantum Vacuum: Much Ado about Nothing?" Physics Department colloquium, October 1995.

1. "The Quantum Vacuum: Much Ado about Nothing?" Bronfman lunch seminar, October 1995.